Chapter 7
Health and Safety Concerns

HTRW well system O&M has a number of critical health and safety issues related to general well and pump mechanical and electrical operation and control, as well as specific concerns of handling potentially hazardous formation and treatment fluids, and related issues such as confined space operation.

7-1 Health and Safety Plan

O&M safety must be a component of overall site safety. The development and implementation of a specific but flexible plan is needed, including personnel expertise and compliance, and training to make personnel thoroughly familiar with chemical and mechanical activities. Depending on the specific nature of the well system and the nature of the contaminants and treatment chemicals, O&M activities will require worker hazard analyses and compliance with any applicable OSHA standard found in 29 CFR 1910 and/or 29 CFR 1926, in addition to any applicable requirements of EM 385-1-1. In all cases, the O&M safety and health managers will be required to comply with 29 CFR 1910.132 through the performance of a site-specific hazard analysis, the selection of personal protective equipment (PPE) appropriate to protect workers from the hazards identified, a written hazard assessment certification, and worker training in the hazards and PPE to be used. The following guidance will assist in that effort.

7-2 Level of Protection for Mixing and Well Application

Well maintenance treatments involve the use of reactive chemicals (Sections 6-1 and 6-2). Once a chemical regime is selected, the appropriate use of chemical-resistant gloves, boots, and apparel, full-face splash shields, and other specific protection such as for handling hot and supercold solutions should be specified. See Section 6-1 and other references. An excellent strategic policy for safety is to, as a rule, employ treatment mixtures that minimize hazard and the likelihood of personal injury due to error, while still being effective. The mixture in Appendix C is one such treatment.

7-3 Chemical Handling Hazards

a. *Transferring chemical solutions*. Typically, the major exposure injury risk point during PM treatment is at drums containing concentrated acid, caustic, or oxidizing agent solutions. Spilling or transfer hose troubles may result in skin exposure. Vapors may cause mucous membrane and eye tissue irritation or damage. Persons handling concentrated chemicals should wear full-face splash guards and respirators and chemical resistant clothing and gloves. Persons handling dilute solutions may work with care in OSHA Level D gear (29 CFR 1910).

7-4 Mixing Chemicals

a. Mixing hazards. Mixing of concentrated reactive solutions can result in personal hazards. For example, neutralization of acids poses a potential hazard if basic compounds are added too rapidly to strongly acid solutions (pH <5). Significant foaming may occur.

b. Hazard review. Personnel should review how to handle specific chemical source stock and solutions. MSDS provide general guidance but should not be relied upon for complete instructions, which should be in the site-specific O&M Site Safety and Health Plan (Section 7-1). General chemical mixing safety requirements are listed below:

- Personnel should always add acid to water and not vice versa.
- Strong oxidants should never be used where hydrocarbon concentrations are high in well water solutions, as ignition is a low-but-not-zero probability.
- Alkaline and caustic compounds should be added slowly to acidic compounds when neutralization is required, and never added to wells when acid solutions are still in the well.
- Hoses, valves, and connections should be secured and not leaking. Spraying acid or oxidant chemicals can result in dermal burns and clothing damage.
- All work should be conducted in unobstructed and well-ventilated areas.
- Personnel must routinely review MSDS and company recipe sheets before each treatment event and work at a deliberate pace, avoiding rush.
- Extra lime or soda ash should be kept on hand to treat spills, and eyewash packages and abundant clean water should be kept close at hand for dilution when personnel are splashed.